

CLAIMS

Having thus set forth and disclosed the nature of this invention, what is claimed is:

1. A forming assembly for producing a vertically disposed poured-in-place wall structure, said assembly comprising:

a) wall molding means for forming laterally spaced, opposed molding surfaces that define a wall mold cavity for forming said wall structure,

b) said wall molding means including panel holding means for vertically disposing laterally spaced wall forming panels to provide said molding surfaces along opposed sides of said wall mold cavity,

c) said cavity having an upwardly directed top opening into which hardenable material is to be poured and hardened to produce said wall structure within said wall mold cavity,

d) reinforcement rod suspending means for freely positioning and retaining horizontally and freely disposed reinforcement rod means at a preselected horizontal location spaced inwardly from each said opposed molding surface within said mold cavity, and

e) means for attaching said rod suspending means to said opposed wall forming panels for locating said horizontally disposed rod means at spaced preselected vertical locations between said spaced molding surfaces,

f) said rod suspending means being effective to retain said reinforcement rod means in place at said preselected horizontal and vertical locations while said hardenable material is being poured into and allowed to harden within said mold cavity.

2. A forming assembly as defined in claim 1 wherein said rod suspending means includes grid means that extends vertically along the vertically disposed molding surfaces.

3. A forming assembly as defined in claim 2 wherein said grid means is sufficiently rigid to project outwardly from a vertically disposed molding surface and to horizontally suspend the reinforcement rod means when said grid means is attached to said vertically disposed molding surface.

4. A forming assembly as defined in claim 1 wherein
said wall forming panels are portable for removable vertical
disposition to form said wall mold cavity, and
said panel holding means is effective to maintain said wall forming
panels independently with respect to each other in said vertical
disposition.

5. A forming assembly as defined in claim 1 wherein
said rod suspending means includes a plurality of vertically
disposed retaining means spaced horizontally with respect to each other
along said opposed spaced molding surfaces,
said reinforcement rod means includes a plurality of rod elements
being horizontally disposed across said plurality of grid means, and
said rod elements extend substantially parallel to the molding
surfaces and are laterally spaced with respect to each other between said
molding surfaces.

6. A forming assembly as defined in claim 1 wherein
said rod suspending means includes a plurality of grid elements that
extend vertically along the vertically disposed molding surfaces and
between the opposed molding surfaces, and
each grid element includes a plurality of tie members horizontally
disposed at spaced preselected vertical locations, and
said grid elements include rod locating means for maintaining said
reinforcement rod means at said vertical locations and horizontally
spaced inwardly from each said opposed molding surface while hardenable
material is being poured into said mold cavity.

7. A forming assembly as defined in claim 6 wherein
said rod locating means includes a pair of elongated parallel grid
members fixedly extending across said plurality of vertically spaced tie
members at each horizontal location between said molding surfaces to
freely retain a reinforcement rod that extends horizontally across the
plurality of vertically disposed grid elements.

8. A forming assembly as defined in claim 1 wherein

said reinforcement rod means includes at least two elongate rod members each freely positioned horizontally at a spaced inward distance from the opposed molding surfaces and at a spaced outward distance from a centerline located between said opposed molding surfaces.

9. A device for disposing reinforcement rod means in a

poured-in-place wall mold cavity defined by opposed molding surfaces of opposed vertically disposed wall molding panels, said device comprising:

a) reinforcement rod suspending means for freely positioning horizontally disposed reinforcement rod means within said mold cavity at a preselected horizontal location between each said opposed molding surface and at spaced preselected vertical locations vertically and along said opposed wall forming panels, and

b) means for attaching said reinforcement rod suspending means to each of said opposed wall molding panels to retain said reinforcement rod means in place between said wall forming panels at said preselected horizontal and vertical locations while hardenable material is being poured into and allowed to harden within said wall mold cavity.

10. A device as defined in claim 9 wherein

said preselected horizontal location is spaced inwardly from each said molding surface,

said wall molding panels are removable, and

said reinforcement rod suspending means is removably attached to said wall molding panels.

11. A device as defined in claim 9 wherein

said rod suspending means includes grid means that extends vertically along the vertically disposed molding surfaces.

12. A device as defined in claim 11 wherein

said grid means is sufficiently rigid to project outwardly from a vertically disposed molding surface and to horizontally suspend the reinforcement rod means when said grid means is attached to said

vertically disposed molding surface.

13. A device as defined in claim 9 wherein

said rod suspending means includes a plurality of vertically
disposed retaining means spaced horizontally with respect to each other
along said opposed spaced molding surfaces,

said reinforcement rod means includes a plurality of rod elements
being horizontally disposed across said plurality of grid means, and

said rod elements extend substantially parallel to the molding
surfaces and are laterally spaced with respect to each other across the
width between said molding surfaces.

14. A device as defined in claim 9 wherein

said rod suspending means includes a plurality of grid elements that
extend vertically along the vertically disposed molding surfaces and
between the opposed molding surfaces, and

each grid element includes a plurality of tie members horizontally
disposed at spaced preselected vertical locations, and

said grid elements include rod locating means for maintaining said
reinforcement rod means at said vertical locations and horizontally
spaced inwardly from each said opposed molding surface while hardenable
material is being poured into said mold cavity.

15. A device as defined in claim 14 wherein

said rod locating means includes a pair of elongated parallel grid
members fixedly extending across said plurality of vertically spaced tie
members at each horizontal location between said molding surfaces to
freely retain a reinforcement rod that extends horizontally across the
plurality of vertically disposed grid elements.

16. A device as defined in claim 15 wherein

each end of an upper said tie member and a lower said tie member has
a portion thereof formed back upon itself to define a loop, and

each opposed molding surface includes means for receiving said loop
ends of said upper and lower tie members for removably attaching the rod

suspending means to said wall panels.

17. A device as defined in claim 9 wherein

said rod suspending means retains reinforcement rod means that includes at least two elongate rod members each freely positioned horizontally at a spaced inward distance from the opposed molding surfaces and at a spaced outward distance from a centerline located between said opposed molding surfaces.

18. A poured-in-place forming assembly for producing a building including a molded monolithic structure consisting of a floor slab and inner and outer building walls that form a plurality of rooms defined by a building floor plan, said assembly comprising:

a) floor molding means for forming laterally spaced, opposed molding surfaces that define a slab mold cavity having an upwardly directed top slab mold opening into which hardenable material is to be poured and hardened within said slab mold cavity,

b) said floor molding means being effective to form a floor slab having a top surface and upstanding inner and outer wall portions projecting upwardly from the floor slab top surface that define the inner and outer building walls according to said building floor plan,

c) wall molding means for forming laterally spaced, opposed molding surfaces that define a wall mold cavity having an upwardly directed top wall mold opening into which hardenable material is to be poured and hardened within said wall mold cavity,

d) said wall molding means including vertically disposed inner and outer building wall mold segments having forming panels which are laterally spaced along opposed sides of said upstanding inner and outer wall portions to define a wall structure having a top plan view shape according to said building floor plan,

e) said forming panels for said outer building walls include internal panels for being juxtaposed internal sides of said upstanding outer wall portion, and external panels for being juxtaposed external sides of the upstanding outer wall portions to define said outer building walls of said wall structure,

5 f) said forming panels for said inner building walls and said internal panels for said outer building walls each having the same length to form an upper ceiling level defining a preselected ceiling height measured upwardly from said floor slab top surface inside each room of said building floor plan, and

10 g) ceiling molding means for forming an interior profile of said top wall mold opening that defines said inner building walls and the internal sides of said outer building walls of said building floor plan along said upper ceiling level of said forming panels of the inner building walls and internal wall forming panels of the outer building walls,

h) said external forming panels of said outer building walls being effective to form an exterior profile of said top wall mold opening that defines said external sides of said outer building walls of said building floor plan,

15 i) said external wall forming panels being sufficiently longer than said internal wall panels to form an upper edge along said exterior profile that extends above the height of said preselected ceiling height for producing a preselected thickness for a molded ceiling slab when hardenable material is poured into and allowed to harden within said mold cavity.

20 19. An assembly as defined in claim 18 wherein

25 said wall molding means includes reinforcement rod supporting means for placing horizontally disposed reinforcement rods in said wall mold cavity defined by opposed molding surfaces.

20. An assembly as defined in claim 19 wherein

30 said reinforcement rod supporting means being effective to freely position and suspend said horizontally disposed reinforcement rods within said mold cavity at a preselected horizontal location between each said opposed molding surface and at preselected vertical locations spaced vertically and horizontally along said opposed wall forming panels.

35 21. An assembly as defined in claim 20 wherein

said rod supporting means includes grid means that extends

vertically along the vertically disposed molding surfaces, and

means for attaching said grid means within said wall mold cavity to retain said reinforcement rods in place at said preselected horizontal and vertical locations while said hardenable material is being poured into and allowed to harden within said wall mold cavity.

22. An assembly as defined in claim 21 wherein

said grid means is sufficiently rigid to project outwardly from a vertically disposed molding surface and is effective to horizontally suspend the reinforcement rod means when said grid means is attached to said vertically disposed molding surface.

23. An assembly as defined in claim 19 wherein

said rod supporting means includes a plurality of vertically disposed retaining means spaced horizontally with respect to each other along said opposed spaced molding surfaces,

said reinforcement rod means includes a plurality of rod elements being horizontally disposed across said plurality of grid means, and

said rod elements extend substantially parallel to the molding surfaces and are laterally spaced with respect to each other between said molding surfaces.

24. An assembly as defined in claim 19 wherein

said rod supporting means includes a plurality of grid elements that extend vertically along the vertically disposed molding surfaces and between the opposed molding surfaces, and

each grid element includes a plurality of tie members horizontally disposed at spaced preselected vertical locations, and

said grid elements include rod locating means for maintaining said reinforcement rod means at said vertical locations and spaced inwardly from each said opposed molding surface while said hardenable material is being poured into said mold cavity.

25. An assembly as defined in claim 24 wherein

said rod locating means includes a pair of elongated parallel grid

members fixedly extending across said plurality of vertically spaced tie members at each horizontal location between said molding surfaces to freely retain a reinforcement rod that extends horizontally across the plurality of vertically disposed grid elements.

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26. An assembly as defined in claim 25 wherein

each end of an upper said tie member and a lower said tie member has a portion thereof formed back upon itself to define a loop, and

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each opposed molding surface includes means for receiving said loop ends of said upper and lower tie members for removably attaching the rod suspending means to said wall panels.

27. An assembly as defined in claim 19 wherein

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said rod supporting means retains reinforcement rod means that includes at least two elongate rod members each freely positioned horizontally at a spaced inward distance from the opposed molding surfaces and at a spaced outward distance from a centerline located between said opposed molding surfaces.

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28. A forming method for producing a vertically disposed poured-in-place wall structure, said method comprising the steps of:

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a) providing wall molding means including panel holding means for forming laterally spaced, opposed molding surfaces that define a wall mold cavity for forming said wall structure,

b) said wall mold cavity having an upwardly directed top opening into which hardenable material is to be poured and hardened to produce said wall structure within said wall mold cavity,

c) vertically disposing first wall forming means to provide a first molding surface along one side of said wall mold cavity,

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d) providing reinforcement rod suspending means sufficiently rigid for freely positioning and retaining reinforcement rod means horizontally along said first molding surface within said mold cavity,

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e) attaching a first edge of said reinforcement rod suspending means to said wall forming means to project outwardly from said first molding surface, then

f) freely positioning said reinforcement rod means to horizontally rest on said rod suspending means at a spaced distance from said first molding surface and at a plurality of preselected vertical locations spaced along said first molding surface, then

5 g) vertically disposing second wall forming means opposed to the first wall forming means to provide a second molding surface opposed to said first molding surface, and

10 h) attaching the other outwardly projecting edge of said reinforcement rod suspending means to the second wall forming means for retaining said reinforcement rod means in place at said preselected horizontal and vertical locations while hardenable material is being poured into and is allowed to harden within said mold cavity.

29. A forming method as defined in claim 28 wherein

15 said first wall forming means includes a plurality of wall forming panels to provide said first molding surface, and

20 said second wall forming means includes a plurality of wall forming panels to provide said second molding surface.

30 30. A forming method as defined in claim 28 wherein

35 said rod suspending means includes grid means that extends vertically along the vertically disposed molding surfaces.

31. A forming method as defined in claim 28 wherein

25 said rod suspending means includes a plurality of vertically disposed retaining means spaced horizontally with respect to each other along said opposed spaced molding surfaces,

30 said reinforcement rod means includes a plurality of rod elements being horizontally disposed across said plurality of grid means, and

35 said rod means extending substantially parallel to the molding surfaces and being laterally spaced with respect to each other between said molding surfaces.

32. A forming method as defined in claim 28 wherein

said wall forming panels are portable for removable vertical

disposition to form said wall mold cavity, and

said panel holding means is effective to independently maintain said wall forming panels with respect to each other in said vertical disposition.

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33. A forming method as defined in claim 28 wherein

said rod suspending means includes a plurality of grid elements that each extend vertically along the vertically disposed molding surfaces and between the opposed molding surfaces,

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each grid element includes a plurality of tie members horizontally disposed at spaced preselected vertical locations,

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said grid elements include rod locating means for maintaining said reinforcement rod means at said vertical locations and spaced inwardly from each said opposed molding surface while hardenable material is being poured into said mold cavity.

34. A forming method as defined in claim 33 wherein

said rod locating means includes a pair of elongated parallel grid members fixedly extending across said plurality of vertically spaced tie members at each horizontal location between said molding surfaces to freely retain a reinforcement rod that extends horizontally across the plurality of vertically disposed grid elements.

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35. A forming method as defined in claim 28 wherein

said reinforcement rod means includes at least two elongate rod members each freely positioned horizontally at a spaced inward distance from the opposed molding surfaces and at a spaced outward distance from a centerline located between said opposed molding surfaces.

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36. A poured-in-place forming process for producing on a building site a building including a molded monolithic structure consisting of floor and ceiling slabs, and inner and outer building walls that form a plurality of rooms defined by a building floor plan, said process comprising the steps of:

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a) providing floor molding means forming laterally spaced, opposed

molding surfaces that define a slab mold cavity having an upwardly directed top slab mold opening into which hardenable material is to be poured and hardened within said slab mold cavity,

b) pouring hardenable material into said slab mold cavity and allowing it to harden and form a floor slab having a top surface and upstanding inner and outer wall portions projecting upwardly from the floor slab top surface that define the inner and outer building walls according to said building floor plan, then

c) removing said floor molding means after the material has hardened to provide a cleared floor slab top surface and laterally spaced opposing sides of the upstanding wall portions in preparation for forming an upper portion of said monolithic building structure,

d) providing upper building molding means forming laterally spaced, opposed molding surfaces that define an upper building mold cavity including a wall mold cavity having an upwardly directed top wall mold opening into which hardenable material is to be poured and hardened within said upper building mold cavity,

e) vertically disposing inner and outer building wall mold segments including internal and external forming panels having one end thereof resting on said floor slab top surface and juxtaposing said forming panels to said spaced laterally opposing sides of said upstanding inner and outer wall portions to define a wall structure having a layout according to said building floor plan,

f) said internal forming panels being juxtaposed internal sides of said upstanding outer wall portion, and said external forming panels being juxtaposed external sides of the upstanding outer wall portions to define said outer building walls of said wall structure,

g) said internal panels for forming said inner building wall mold segments and an inner wall portion of said outer building wall mold segments each having the same length to form an upper ceiling level defining a preselected ceiling height measured upwardly from said floor slab top surface inside each room of said building floor plan, and

h) horizontally disposing ceiling mold panels along said upper ceiling level of said internal forming panels of said inner and outer building wall mold segments to form an interior profile of said top wall

mold opening,

i) said external forming panels of said outer building wall mold segments forming an exterior profile of said top wall mold opening,

j) said external forming panels being sufficiently longer than said internal panels to form an upper edge on said exterior profile that extends above the height of said interior profile of said top wall mold opening,

k) pouring hardenable material into said upper building mold cavity and allowing it to harden and form said upper building portion of said monolithic structure having a molded ceiling slab with a preselected thickness, and

l) removing said upper building molding means after said material has hardened.

37. A forming process as defined in claim 36 wherein

said vertically disposing step includes vertically disposing first wall forming means to provide a first molding surface along one side of said wall mold cavity,

providing reinforcement rod suspending means sufficiently rigid for freely positioning and retaining reinforcement rod means horizontally along said first molding surface within said wall mold cavity,

attaching a first edge of said reinforcement rod suspending means to said first wall forming means to project outwardly from said first molding surface, then

freely positioning said reinforcement rod means to horizontally rest on said rod suspending means at a spaced distance from said first molding surface and at a plurality of preselected vertical locations spaced along said first molding surface, then

vertically disposing second wall forming means opposed to the first wall forming means to provide a second molding surface opposed to said first molding surface, and

attaching the other outwardly projecting edge of said reinforcement rod suspending means to the second wall forming means for retaining said reinforcement rod means in place at said preselected horizontal and vertical locations while hardenable material is being poured into and is

allowed to harden within said mold cavity.

38. A forming process as defined in claim 36 wherein

said first wall forming means includes a plurality of wall forming panels to provide said first molding surface, and

said second wall forming means includes a plurality of wall forming panels to provide said second molding surface.

39. A forming process as defined in claim 36 wherein

said providing floor molding means step includes horizontally disposing reinforcement rods to extend in at least one direction across the width of said floor slab mold cavity,

said providing upper building molding means step includes horizontally disposing reinforcement rods to extend in at least one direction across the width of said ceiling slab mold cavity portion, and

said providing upper building molding means step includes vertically disposing reinforcement rods to extend vertically along the height of each inner and outer wall mold cavity segment of said wall mold cavity portion.

40. A forming process as defined in claim 39 wherein

said horizontally disposed reinforcement rods extend in two horizontal directions that are perpendicular with respect to each other within each said floor and ceiling slab mold cavity, and

said vertically disposed reinforcement rods in said inner and outer wall mold cavity segments are coextensive with corresponding horizontally disposed reinforcement rods to produce a complete outer reinforcement rod cage structure disposed within the hardened floor slab, outer building wall structure, and ceiling slab.

41. A forming process as defined in claim 36 wherein

said rod suspending means includes a plurality of vertically disposed retaining means spaced horizontally with respect to each other along said opposed spaced molding surfaces,

said reinforcement rod means includes a plurality of rod elements being horizontally disposed across said plurality of grid means, and said rod elements extending substantially parallel to the wall molding surfaces and being laterally spaced with respect to each other between said molding surfaces of said outer wall building mold segments.

42. A forming process as defined in claim 36 wherein

said reinforcement rod elements in said outer wall building mold segments include at least two elongate rod members each freely positioned horizontally at a spaced inward distance from the opposed molding surfaces and at a spaced outward distance from a centerline located between said opposed molding surfaces.

43. A fixed construction poured-in-place at a building site, said construction comprising:

a) monolithic floor slab means including a floor upper surface and integrally formed upstanding wall portions projecting upwardly from the floor upper surface by an amount sufficient to form opposed lateral sides that are effective to laterally support contiguously disposed elongate wall forming panels that project upwardly from the floor upper surface for providing a wall mold cavity,

b) said upstanding wall portions extend along said floor upper surface to define a wall structure having a layout of inner and outer walls for rooms of a building in accord with a preselected floor plan,

c) said upstanding wall portions including opposed laterally spaced sides that define a preselected wall thickness and that are effective to provide lateral support for panel means having molding surfaces that extend upwardly from said wall portions to form the wall mold cavity having an upwardly directed top wall mold opening into which hardenable material is to be poured and hardened within said wall mold cavity.

44. A fixed construction as defined in claim 43 wherein

an upper building wall structure of the construction defines an enclosed monolithic concrete building structure consisting of a floor slab, at least one ceiling slab, and inner and outer building walls that

form a plurality of rooms defined by layout in accord with a preselected building floor plan.

45. A freestanding fixed construction poured-in-place at a building site, said construction comprising:

a) an enclosed monolithic concrete building structure including a floor slab having a top surface, and an upper building portion having a ceiling slab and a wall structure,

b) said wall structure including integrally formed upstanding inner and outer wall segments that project upwardly from the floor top surface to a preselected ceiling height,

c) said ceiling slab being located at said ceiling height measured from the top surface of said floor slab to the top of each said wall segment,

d) said wall structure extends along said floor top surface in a room layout of a building in accord with a preselected floor plan,

e) said floor and ceiling slabs including horizontally disposed reinforcement rods that extend in at least one direction across the width of each said slab,

f) said upstanding wall segments including opposing exterior wall surfaces and vertically disposed reinforcement rods that extend vertically between said exterior wall surfaces and along the height of each said inner and outer wall segment,

g) a plurality of vertically disposed retaining means spaced horizontally with respect to each other and a plurality of reinforcement rod elements horizontally disposed across said plurality of retaining means between said exterior wall surfaces, and

h) said reinforcement rod elements extend in a direction that is substantially parallel to the exterior wall surfaces, and being laterally spaced with respect to each other between said exterior wall surfaces of said outer wall building segments.

46. A freestanding construction as defined in claim 45 wherein said horizontally disposed reinforcement rods within said floor and ceiling slabs extend in two horizontal directions that are perpendicular

with respect to each other, and

said vertically disposed reinforcement rods in said inner and outer wall segments are coextensive with corresponding horizontally disposed reinforcement rods to produce a reinforcement rod cage structure disposed within the hardened floor slab, outer building wall structure, and ceiling slab.

47. A freestanding construction as defined in claim 45 wherein

said horizontally disposed reinforcement rod elements in said outer wall building segments include at least two parallel elongate rod members each positioned horizontally at a spaced inward distance from the opposed exterior wall surfaces and at a spaced outward distance from a centerline located between said opposed exterior wall surfaces.